

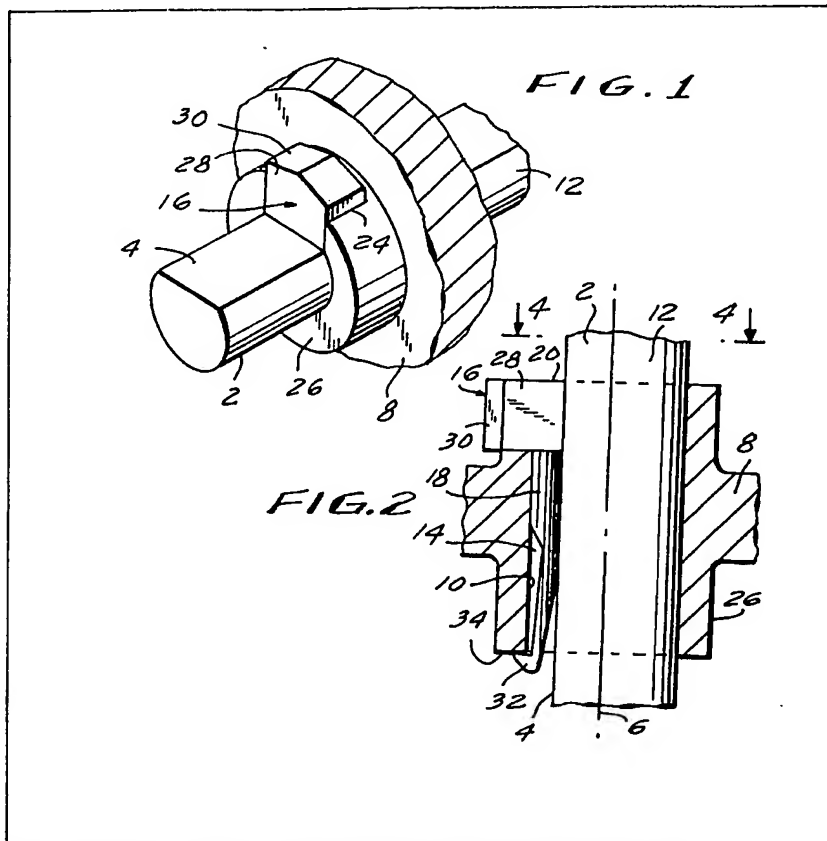
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(54) Securing a hub to a shaft

(57) The hub of a gear or other member is locked in rotation to a shaft by a

longitudinal key. A cylindrical shaft (2) has a flat surface (4) parallel to the axis of a gear hub (8). A wedge (16) has a portion (18) filling the cavity (14) between the cylindrical inside surface (10) of the hub and the flat surface (4) on the shaft. An integral lug (28) of the wedge extends radially outwardly into a slot (24) in the hub to prevent the hub from turning with respect to the wedge. The wedge is prevented from turning with respect to the shaft by its flat bottom surface which is coextensive with the flat surface (4) on the shaft, thereby providing a driving relationship therebetween. The driving relationship between the wedge and the hub is through side surfaces of the slot (24) and the lug (28). A resilient latch (32) on the wedge releasably locks the wedge against axial displacement relative to the hub.



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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FIG. 1

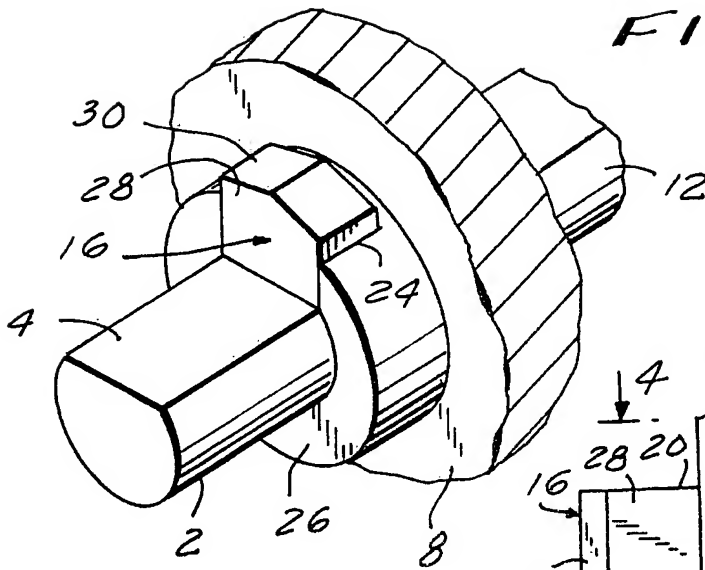


FIG. 2

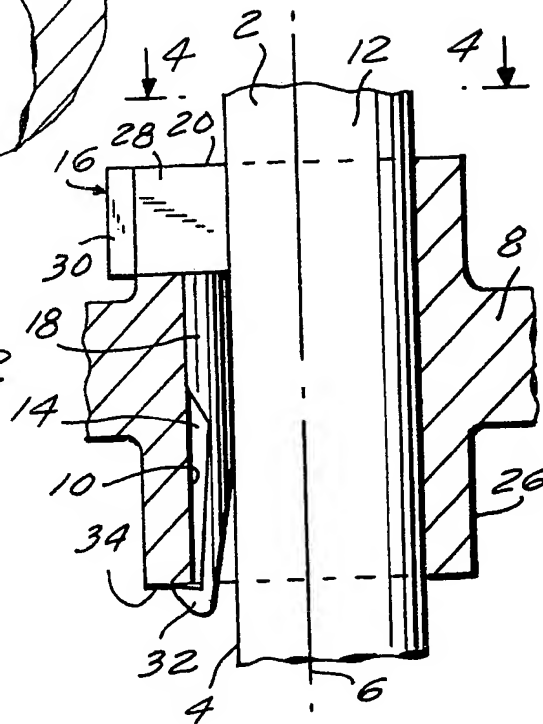


FIG. 3

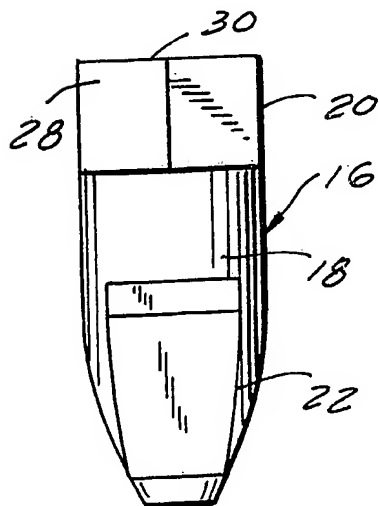
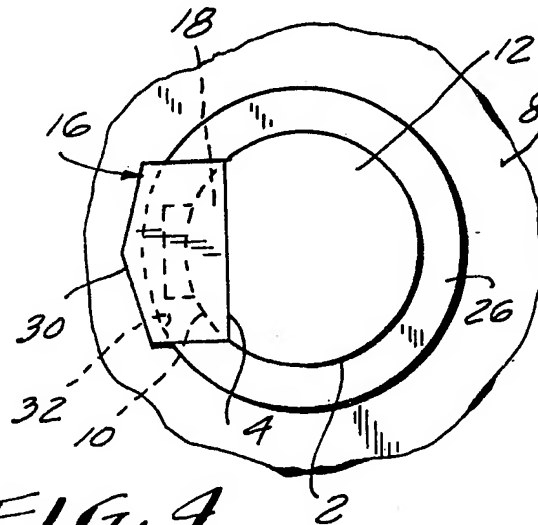


FIG. 4



## SPECIFICATION

**An arrangement for preventing relative rotation between a shaft and the hub of a gear or other member**

5 member

This invention relates to constructions formed by a shaft portion, a gear or other unit mounted thereon through a hub with there being means locking the hub in fixed relationship to the shaft.

An object of this invention is to provide an improved combination of a shaft and a hub. A further object is to provide for the above in such a manner as to permit the ready assembly of the construction, and the removal of the shaft from the hub. A further object is to provide for the above with constructions which are adaptable to various limitations and conditions of use, particularly those encountered in mechanisms in business and industrial machines and instruments.

One embodiment of the invention will now be described with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of the construction;

Figure 2 is a vertical section through the common axis of the shaft and hub of Figure 1;

Figure 3 is a plan view of the wedge of Figures 1 and 2; and

Figure 4 is a sectional view on the line 4-4 of Figure 2.

Referring to Figures 1 and 2 of the drawings, a cylindrical shaft 2 has flat surface 4 which is parallel to the shaft axis 6, and is tangential to an imaginary cylinder (not shown) having the same axis 6 and of lesser diameter than shaft 2. A hub 8 is the hub of a gear, and has an internal cylindrical surface 10 which mates with the outer surface 12 of shaft 2, with a cavity 14 between surface 4 of shaft 2 and the internal surface 10 of the hub. Positioned in cavity 14 is a key or wedge 16 (see also Figure 3) which has a central portion 18 which is snugly received in cavity 14, and end portions 20 and 22. Portions 18 and 20 have a flat bottom surface which is coextensive with the adjacent portion of shaft surface 4, and portion 18 has a top surface which is coextensive with the adjacent portion of hub surface 10. As shown best in Figure 1, hub 8 has a rectangular slot 24 extending radially inwardly from its end wall 26 and radially outwardly from shaft surface 4. Wedge portion 20 has a lug portion or extension 28 (see Figure 2) which extends radially outwardly and is snugly received in slot 24. The top or radially outer extremity of lug portion 28 has a gable top portion 30 (Figure 2) which extends upwardly or radially outwardly beyond the top or radially outer surface of the hub. Wedge portion 22 extends from portion 18 to the end of cavity 14 and has a latch extension 32 which extends radially outwardly along the end face 34 of the hub. Wedge 16 is of nylon and is sufficiently flexible or resilient to permit wedge portion 22 to be flexed radially inwardly when the wedge is projected into cavity 14. The wedge portion 22 then urges its latch portion 32 to the position shown when the wedge is fully in place. Hence, the wedge can be readily installed in cavity 14 by inserting it at surface

26, and it can be removed by pushing latch portion 32 toward shaft surface 4 and then exerting forces on the latch portion and on the top of lug portion 28 of the wedge.

With the construction assembled as shown, hub 8 and shaft 2 are locked together by wedge 16 and the shaft may be driven by the hub or *vice versa*, with the driving forces being exerted through wedge 16. The driving forces between hub 8 and wedge 16 are between the coextensive side faces of lug portion 28 and slot 24 in the hub. The driving forces between wedge 16 and shaft 2 are between surface 4 on the shaft and the coextensive surface of the wedge. That produces a twisting action between lug portion 28 of the wedge and wedge portion 18 adjacent shaft surface 4. During the turning movement, when the shaft is driven, the bottom surface of the wedge on the one-half portion which is leading in the direction of rotation is pressed against surface 4 so that the driving force is exerted over a large area. The twisting action is carried by the cross-section of the wedge at the bottom of lug portion 28.

The invention contemplates that wedge 16 can be so dimensioned and constructed as to fail in shear when there is an unacceptably high driving force, for example, a driving force which would damage a gear or which will produce an undesirable result in the mechanism which is being driven by or is driving shaft 2. As indicated above, hub 8 is the hub of a nylon gear, for example a small nylon gear, which meshes with another gear or other gears in the mechanism, and shaft 2 is a steel shaft, for example a polished steel shaft. The terms "hub" and "shaft portion" are used in their broad senses as meaning a combination of driving and driven components where there is a cylindrical bore in the hub which is keyed to a cylindrical member. In the illustrative embodiment, the flexible characteristics of nylon permit the ready assembly of the gear on the shaft, and the ready removal of the gear. In this embodiment, the shaft is of steel, but the invention contemplates that it may be of other material and the hub may be of other material.

## 110 CLAIMS

1. In combination, a shaft portion and a hub mounted thereon, and a wedge construction having a body portion with a top surface which is an arcuate segment of a cylinder and a bottom surface which is a generally flat surface disposed in a plane generally parallel to the axis of said cylindrical surface, said shaft portion having an outer surface which is an arcuate segment of a cylinder and which effectively complements the first-mentioned arcuate segment to form a substantially complete cylinder, said shaft portion having a generally flat surface which is generally coextensive with the first-mentioned flat surface, said wedge and said hub having interlocking means which present mating surfaces which are positioned radially outwardly from said arcuate segments and which interengage so as to effectively prevent said hub from turning around said axis relative to said wedge, and said hub and said shaft portion are held from turning relative to each other

around said axis.

2. In combination with a shaft portion and a hub mounted thereon, a wedge construction having a body portion with a top surface which is an arcuate segment of a cylindrical surface and a generally flat bottom surface which is in a plane generally parallel to the axis of said cylindrical surface and is also generally parallel to a plane which is defined by said shaft and is tangential to the longitudinal center line of said arcuate segment, said shaft portion having an outer surface which is an arcuate segment of a cylinder with its axis concentric with the first-mentioned axis and having substantially the same radius as the first-mentioned cylindrical surface, said shaft portion having a generally flat surface which is generally coextensive with the first-mentioned flat surface, said wedge and said hub having interlocking means which present mating surfaces which are positioned radially outwardly from said cylindrical surfaces and which interengage so as to effectively prevent said hub from turning around said axis relative to said wedge, and said hub and said shaft portion are held from turning relative to each other around said axis.

3. A mechanism construction comprising the combination of, a steel shaft portion having a flat surface parallel to a predetermined axis, a hub mounted upon said shaft, said hub having a cylindrical inside bore, and said hub and said shaft having substantially coextensive cylindrical surfaces except for the extent of said cavity, said hub providing a cavity between said flat surface of said shaft and an internal surface of said hub, said hub having contact surfaces positioned radially outwardly from said cavity with respect to said axis, a wedge having a portion which is complementary to and snugly received in a portion of said cavity and a lug portion which is spaced axially along said axis relative to said cavity and which projects radially outwardly with respect to said axis and which has surfaces which engage said contact surfaces of said hub and which effectively prevent relative turning movement between said hub and said shaft about said axis.

4. A mechanical construction comprising, the combination of, a shaft portion having an outside cylindrical surface except for a flat surface in a plane generally parallel to the axis of the cylindrical surface, a hub mounted upon said shaft portion and having an inside cylindrical surface mating with the first-mentioned cylindrical surface and with its axis concentric with said axis, and a wedge having a first portion which is dimensioned and shaped to be snugly received between said flat surface on said shaft portion and the coextensive portion of said inside cylindrical surface in said hub, said wedge having a second portion integral with said first portion and positioned in alignment therewith along said flat surface on said shaft portion, said wedge having a third portion integral with said second portion and extending radially outwardly therefrom, said hub having integral means extending parallel to said axis upon the opposite sides of said third portion of said wedge, whereby said wedge is effectively prevented from moving around said axis

relative to said hub, and whereby said wedge is prevented from moving around said axis relative to said shaft portion by the engagement between said wedge and said flat surface of said shaft portion.

5. The combination claimed in any preceding claim, wherein said wedge has latch means which holds said wedge from moving axially of said hub.

6. The combination claimed in any preceding claim, wherein said wedge and said hub have interlocking means which is adapted to hold said wedge and said hub from relative movement in the direction of said axis.

7. A shaft, hub and wedge assembled together or capable of being assembled together substantially as hereinbefore described with reference to the accompanying drawings.

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